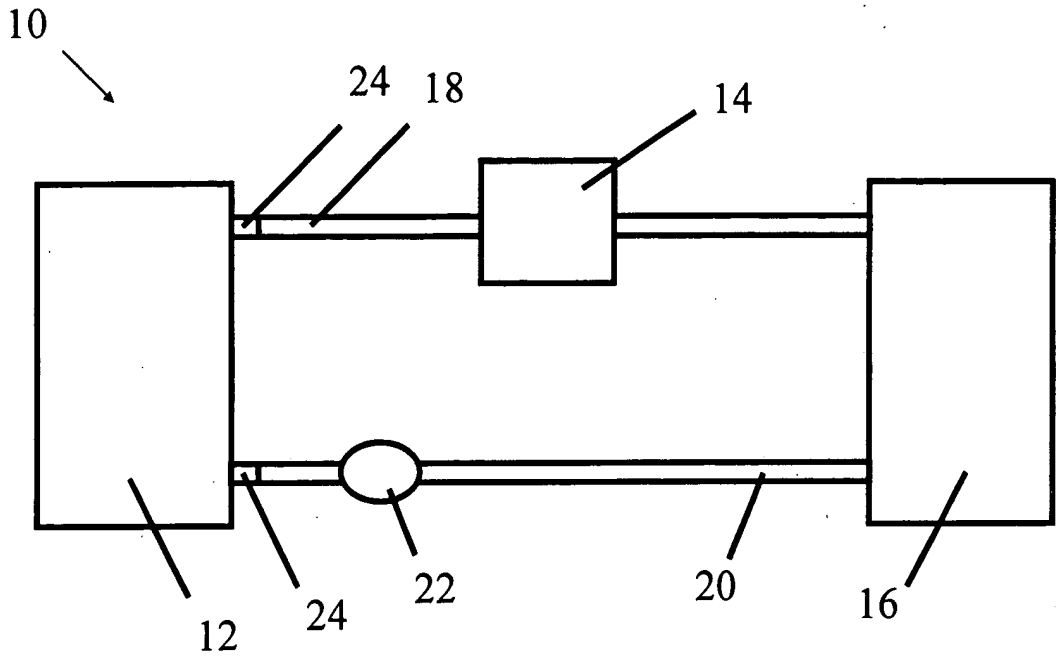


FIG. 1

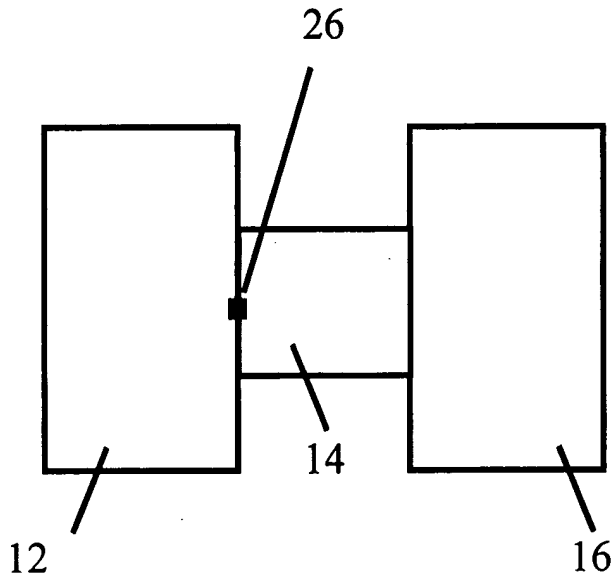


FIG. 2

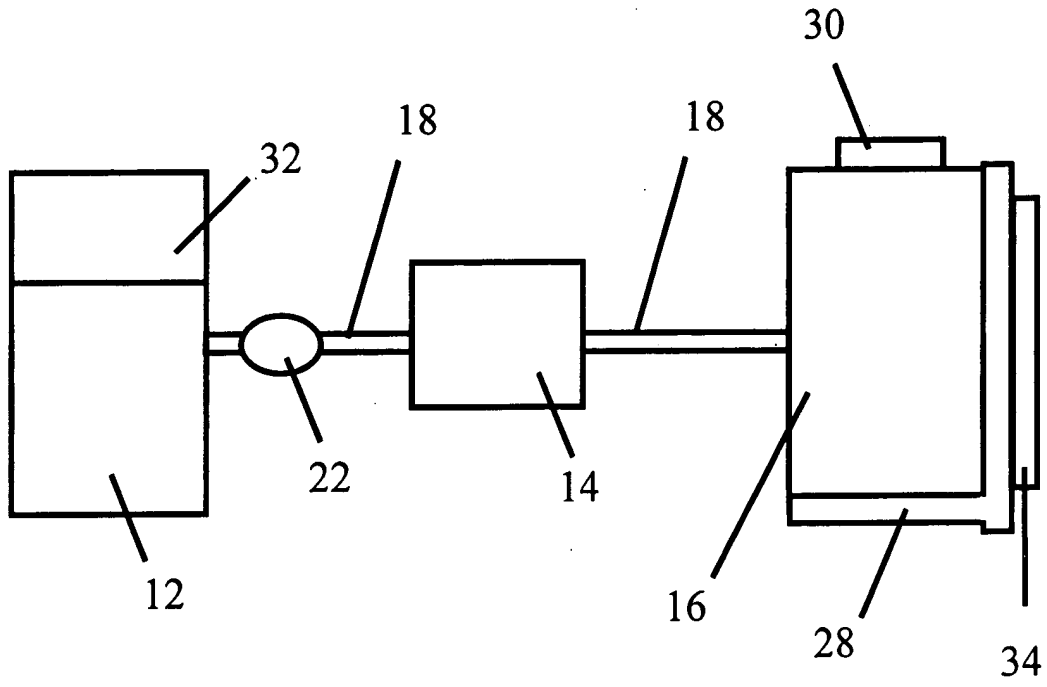


FIG. 3

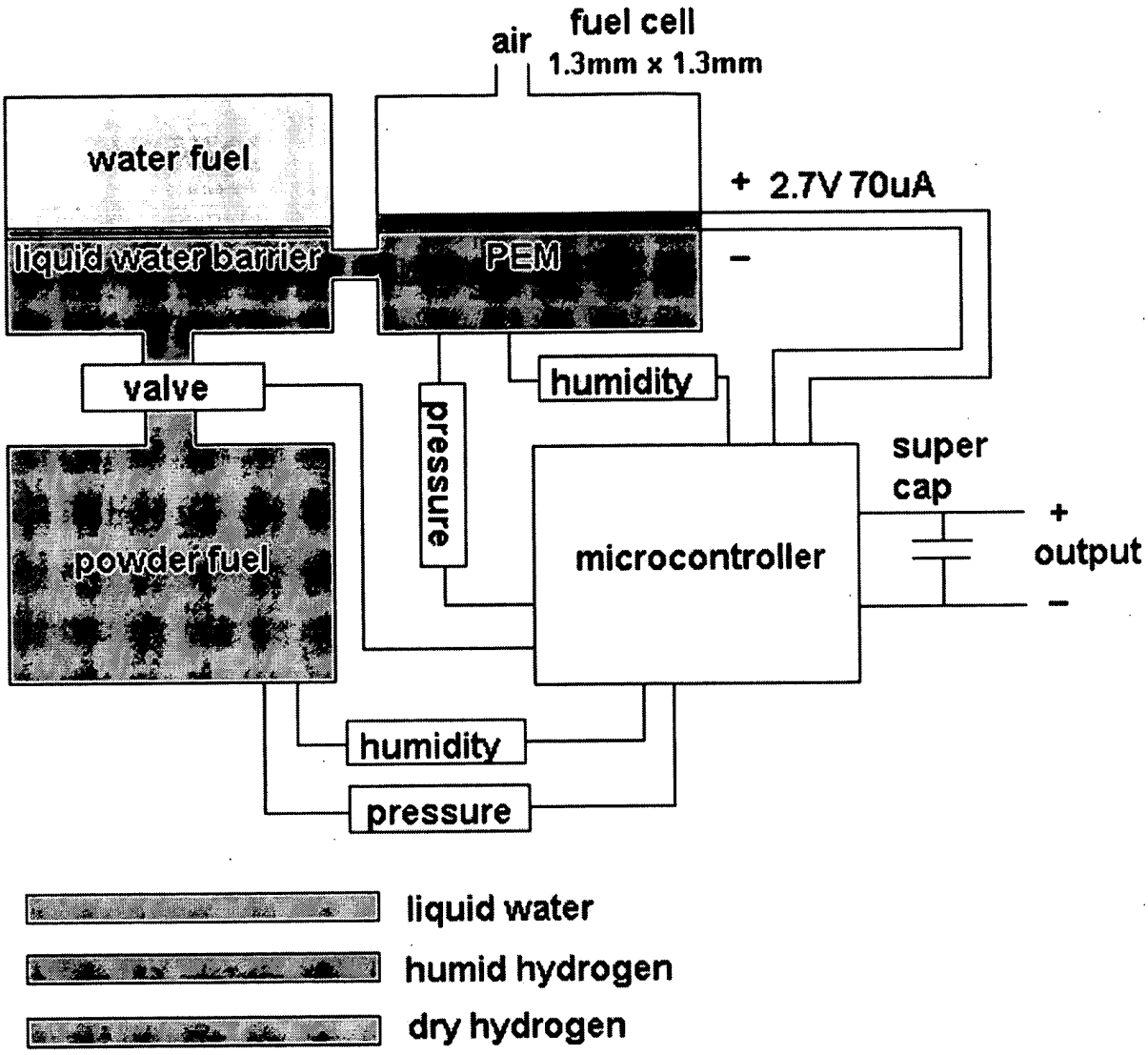

air
fuel cell
1.3mm x 1.3mm
water fuel
+ 2.7V 70uA
liquid water barrier
PEM
–
valve
humidity
pressure
super
cap
+
output
–
powder fuel
microcontroller
humidity
pressure
liquid water
humid hydrogen
dry hydrogen

FIG. 4

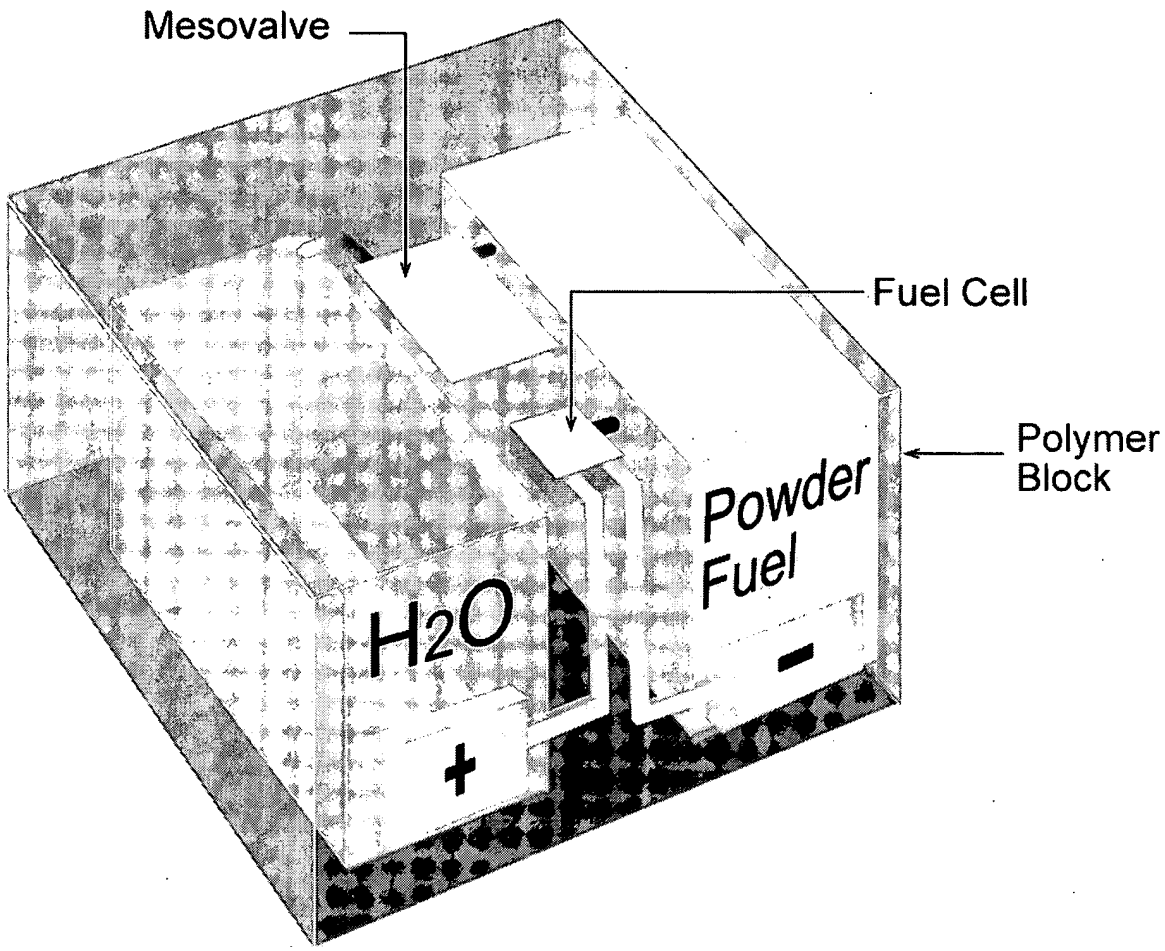


FIG. 5

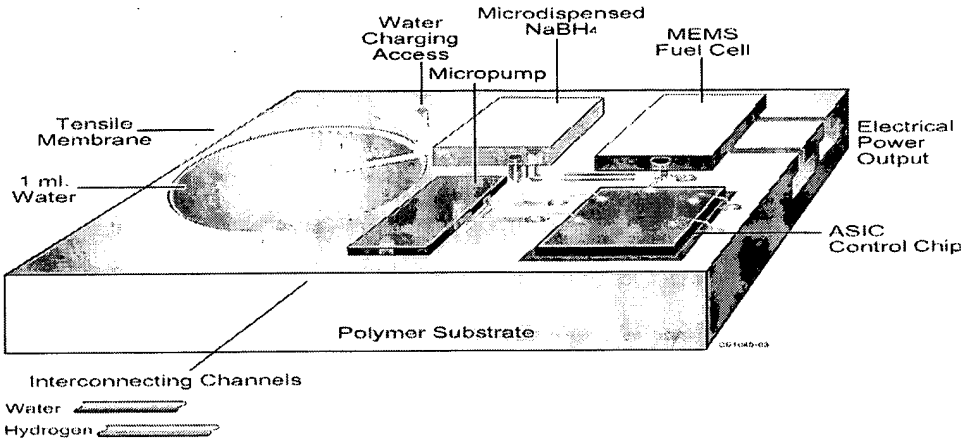

Water
Charging
Access
Microdispensed
NaBH4
MEMS
Fuel Cell
Micropump
Tensile
Membrane
1 ml.
Water
Electrical
Power
Output
ASIC
Control Chip
Polymer Substrate
Interconnecting Channels
Water
Hydrogen

FIG. 6

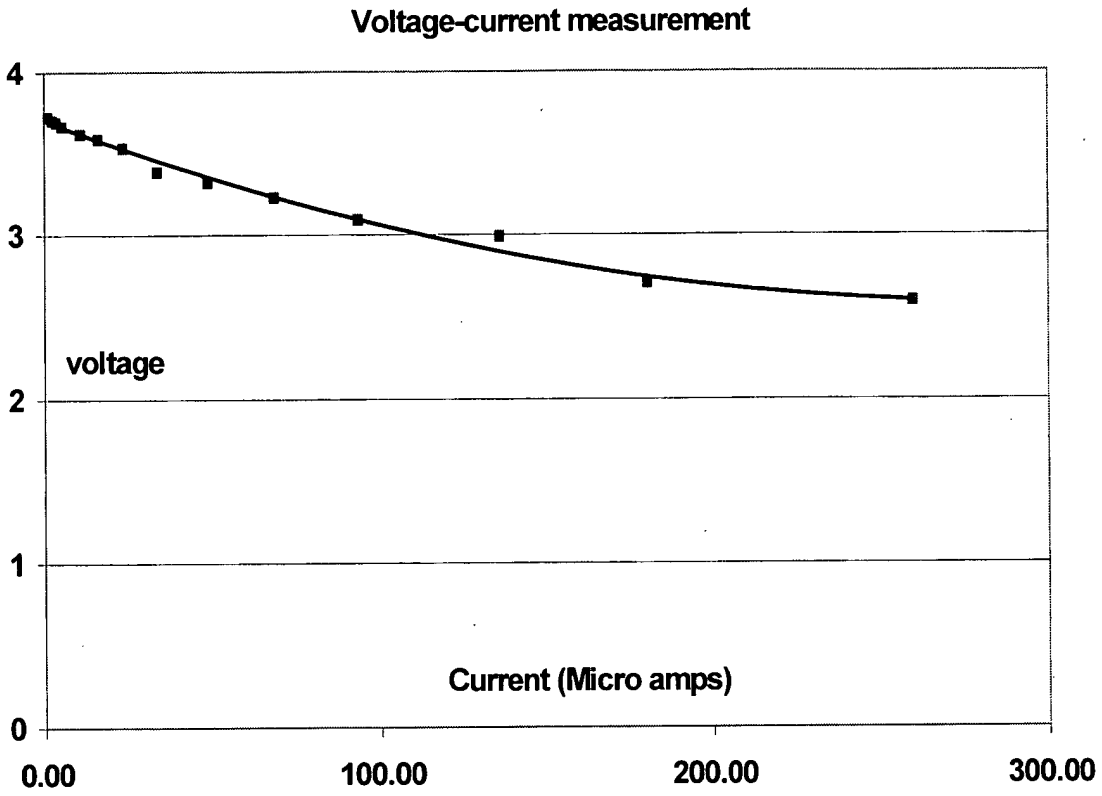

Voltage-current measurement
4
3
2
1
0
voltage
Current (Micro amps)
0.00
100.00
200.00
300.00

FIG. 7

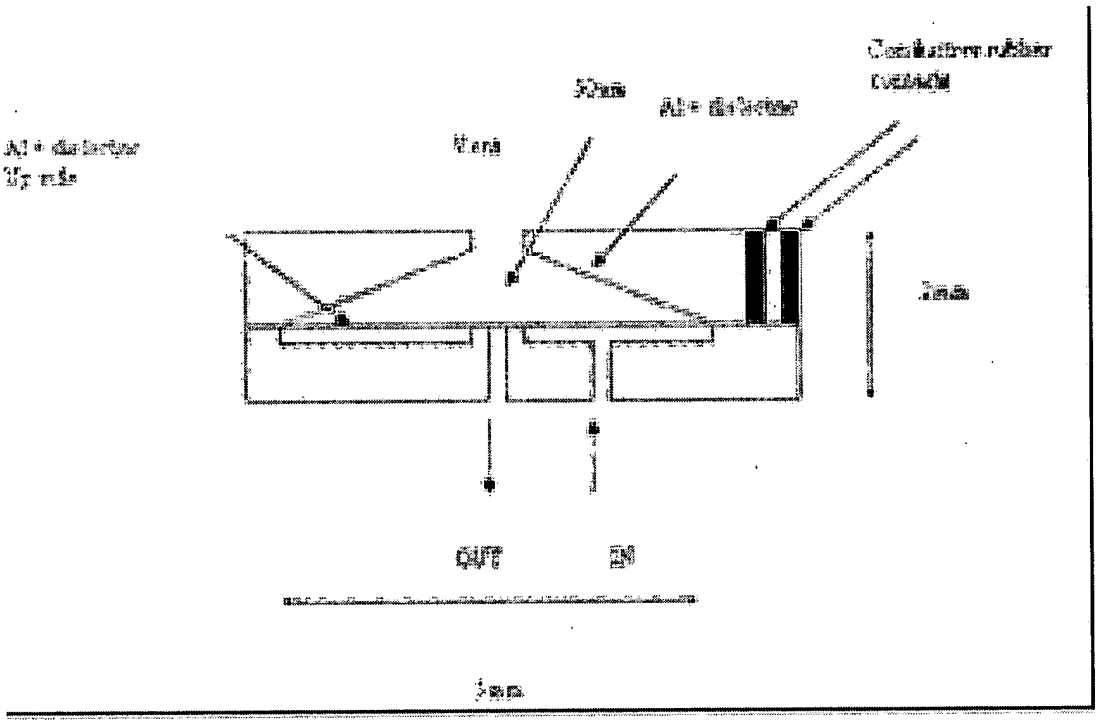
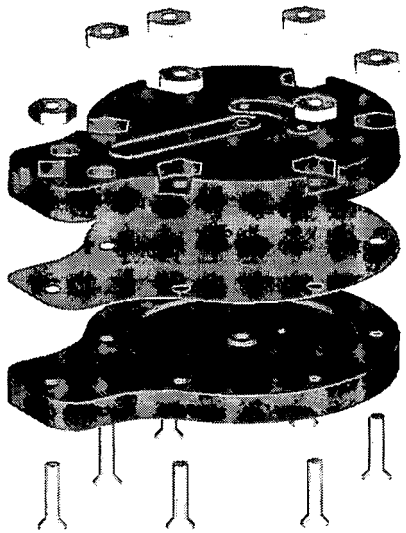


FIG. 8

FIG. 9



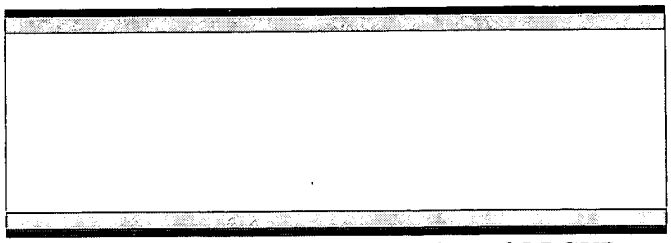


Fig. 10A

Double polished Si wafer with thick thermal oxide and LPCVD nitride suitable for creating through the wafer etch holes.

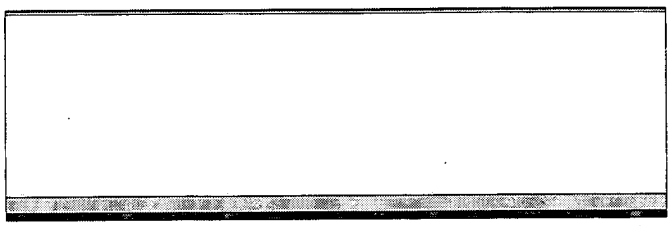


Fig. 10B

Strip off nitride and oxide from front of wafer, grow thin thermal oxide and bottom bridge dielectric (nitride)

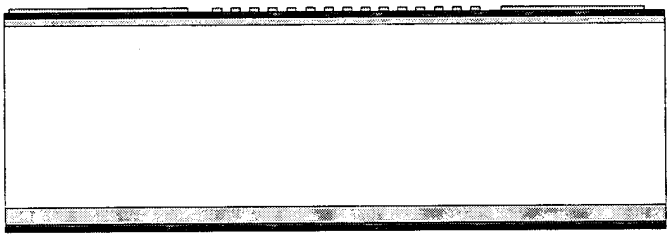


Fig. 10C

Deposit and pattern lower electrode, such as TiW/Au or Cr/Au.

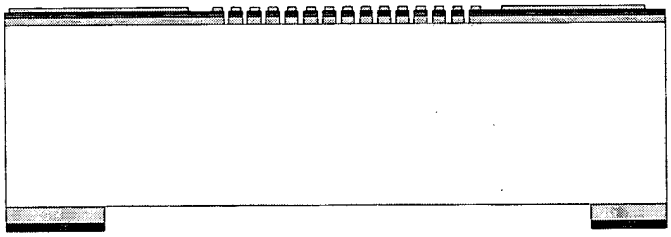


Fig. 10D

Deposit and pattern lower electrode, such as TiW/Au or Cr/Au.

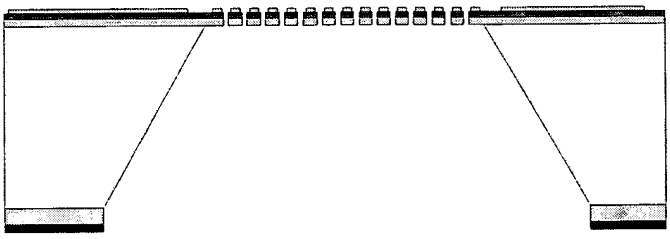


Fig. 10E

Etch from backside to release diaphragms.

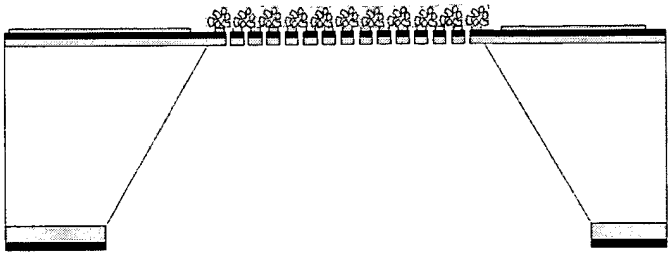


Fig. 10F

Apply catalytic paste by "doctor blading"

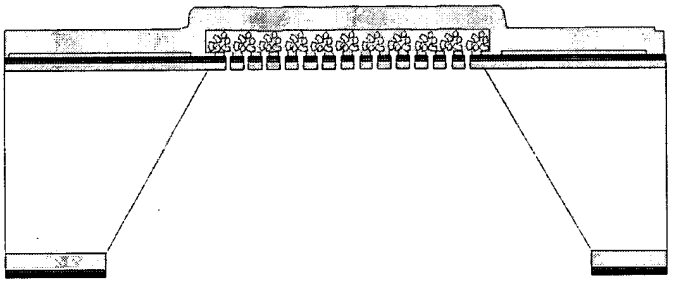


Fig. 10G

Apply PEM layer such as by spinning.

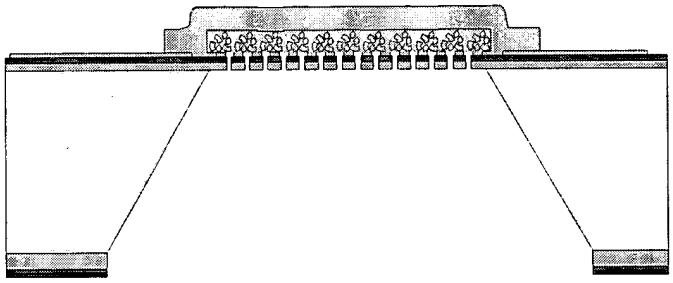


Fig. 10H

Pattern PEM layer

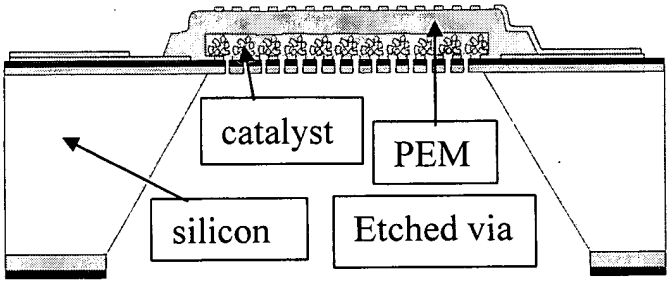


Fig. 10I

Apply and pattern upper electrode

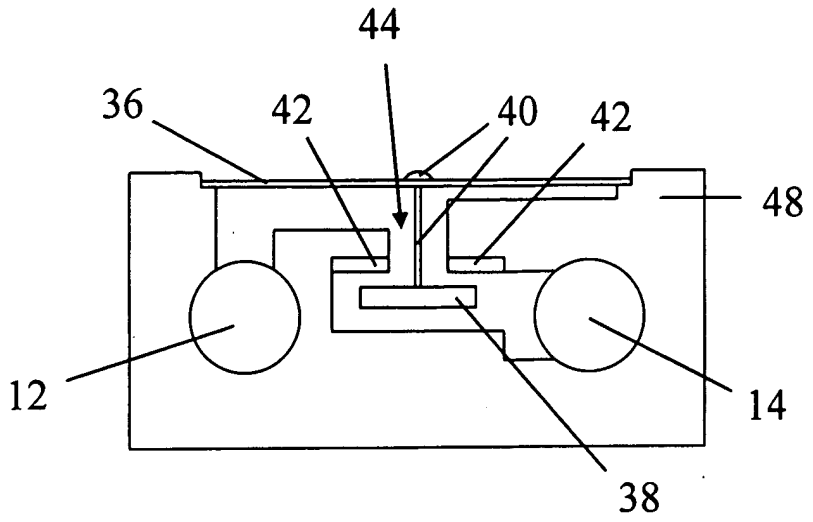


FIG. 11

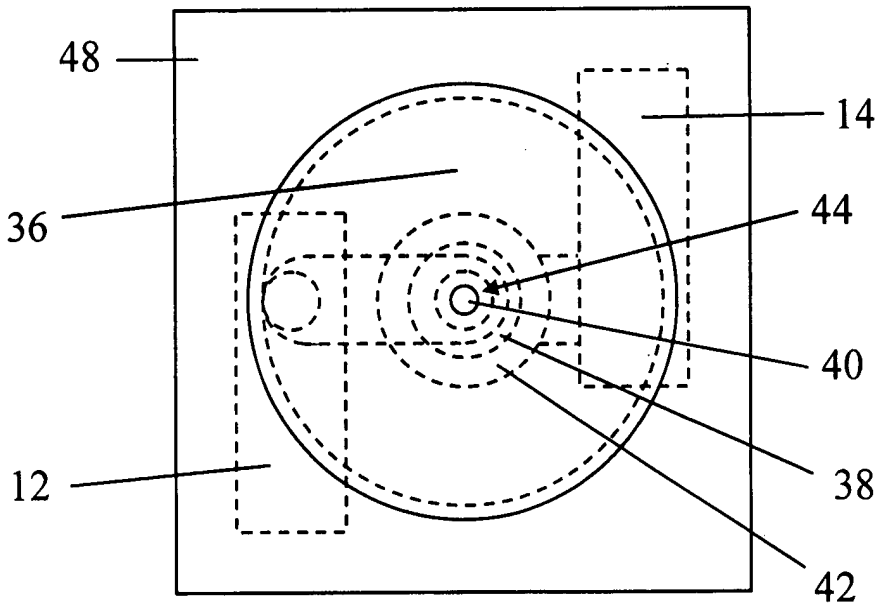


FIG. 12

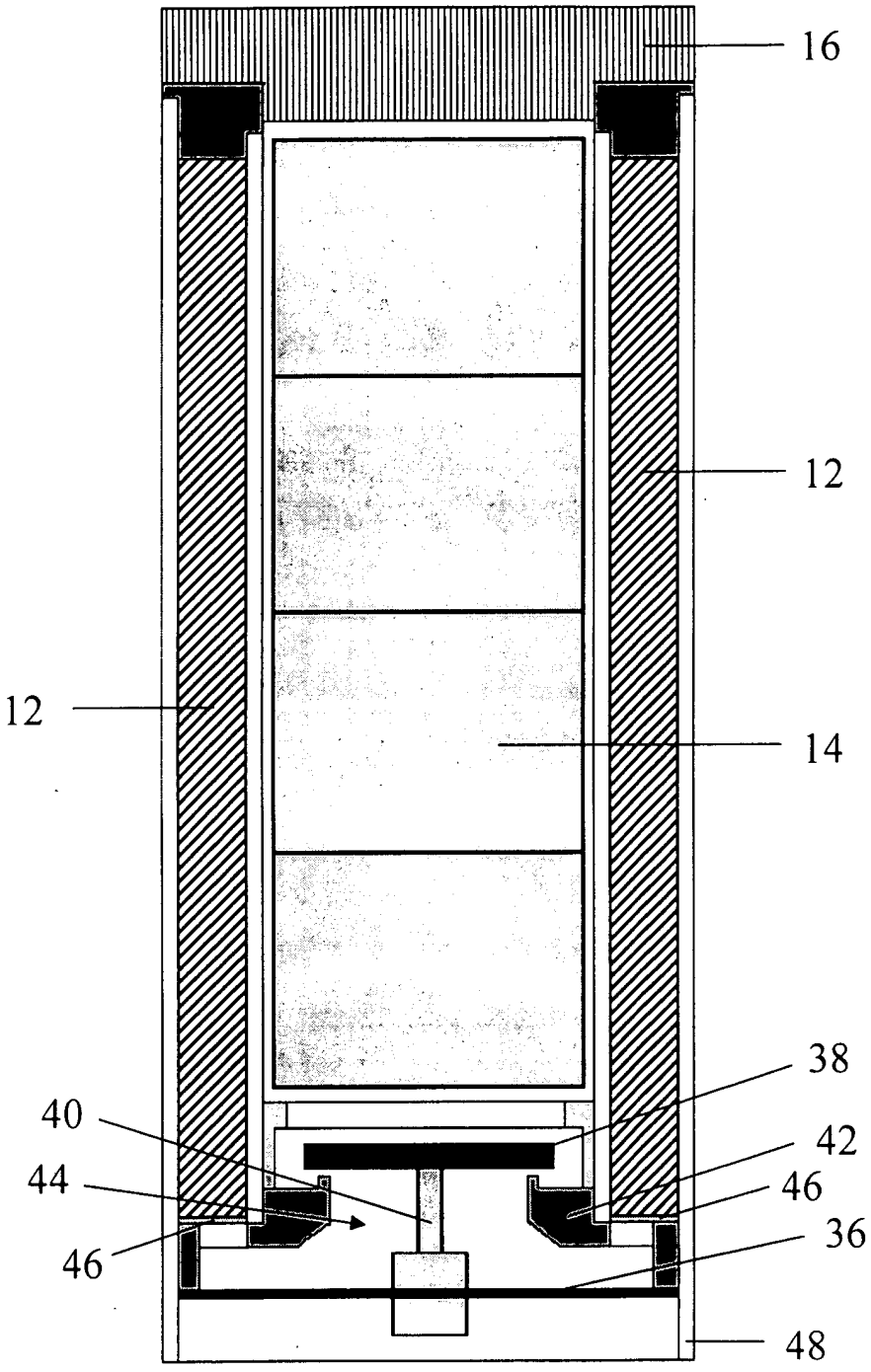


FIG. 13